REMARKS

Claims 1-20 are pending in the application.

Claim Rejections

In the Office Action, claims 1-10 and 12-20 were rejected under 35 U.S.C. §103(a) as being unpatentable over Chu et al. (US Pregrant Publication 2005/0074946; "Chu"). Claim 11 was again rejected under 35 U.S.C. §103(a) as being unpatentable over Chu in view of Williams et al. (US US Pregrant Publication 2004/0020894; "Williams").

It has been noted previously that the pending claims relate to chemical vapor deposition and biased etch back processes that replace fluorine-based etchants with hydrogen. In particular, the claims are directed to a high density plasma chemical vapor etch-enhanced gap fill process using hydrogen as an etchant that can effectively fill high aspect ratio, narrow width gaps while reducing or eliminating dielectric contamination by etchant chemical species. The claimed process involves a multi-step deposition, etch back and deposition process that have separate and distinct deposition and etch operation(s). The deposition operations use a deposition chemistry comprising a silicon-containing dielectric precursor, for example silane (SiH_4). The etch operation(s) use etch process chemistry that is free of silicon-containing dielectric precursor, "consisting essentially of" hydrogen.

In the most recent Office Action the Examiner indicates that he considers that the description in paragraph [0023] that the percentage of He/H_2 can be raised to 70% or above to mean up to and including 100%, and that this description meets the recitation in the independent claims 1 and 16 of an etch process conducted with process chemistry free of silicon-containing dielectric precursor. It is noted that Chu relates to a gap fill process. And it has previously been pointed out that the stated object of the Chu invention is to provide a single step gap-fill process "to avoid the tedious steps in the deposition/etch/deposition methods in the prior art." See paragraph [0009]. Chu describes a single step process chemistry that includes a mixture of hydrogen and helium in a certain ratio to other process gases (paragraphs 0020-0021 and Table 1). As previously noted by the Examiner, Chu does make reference to the possibility that "the gap-filling process may be completed in multiple steps" in paragraph [0025]. However, in describing the nature of this multiple step possibility in the following sentence of that paragraph, Chu indicates that, "The multiple steps may be performed by repeatedly adjusting process parameters...." Further insight into the disclosed "adjusting process parameters" is provided in claim 8 wherein it is recited that the "percentage of He/H_2 in the total reaction gases [which include deposition gases (i.e., oxide precursor such as silane)] is raised with increase of an aspect ratio of the trench.

It is further respectfully submitted that the interpretation of Chu offered by the Examiner is inconsistent with other portions of the Chu disclosure, in particular paragraph [0009], as discussed above. In addition, this interpretation contradicts the immediately prior description in paragraph [0021] wherein it is stated that, "The ranges of the basic parameters of the HDP-CVD process are listed in Table 1." In Table 1, the flow rate of SiH_4 (the silicon-containing dielectric precursor) is given as 20-100 sccm. Thus, at its lowest level, there is always at least 20 sccm of silicon-containing dielectric precursor in the Chu process. This is consistent with the remaining description that Chu teaches a deposition process with deposition parameters that can change, but always has a deposition component, without a discrete etch process. Clearly, Chu does not teach an etch step with process chemistry free of silicon-containing dielectric precursor as presently claimed. In fact, it teaches to the contrary. Accordingly, reconsideration and withdrawal of the rejection of claims 1-10 and 12-20 over Chu is respectfully requested.

With regard to claim 11, Williams is relied upon for its teaching regarding RF inductively coupled plasma. However, it is again respectfully submitted that Williams does not overcome the noted deficiencies of Chu with regard to the claimed invention, and withdrawal of the rejection under 35 U.S.C. §103(a) is also respectfully requested.

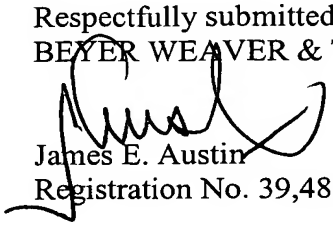
Information Disclosure Statement

A supplemental Information Disclosure Statement (IDS) is being filed concurrently with the filing of this response via the Certificate of Mailing procedure. Entry of this IDS and consideration of the cited references is respectfully requested.

Conclusion

Applicants believe that all pending claims are allowable and respectfully request a Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below. If any additional fees are due in connection with the filing of this amendment, the Commissioner is authorized to charge such fees to Deposit Account 500388 (Order No. NOVLP090).

Respectfully submitted,
BEYER WEAVER & THOMAS, LLP



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